ARTICLE XIX.

Observations of the Magnetic Dip, made in the United States, in 1841. *By J. N. Nicollet. Read September* 16, 1842.

THE following observations were made with a dipping instrument constructed by Robinson, of London, and procured for me by Professor A. D. Bache of Philadelphia. The whole instrument is made of brass; but the vertical circle is plated with silver, upon which the dip is read directly to ten minutes, which, by estimation, may be easily divided to one or two minutes. The horizontal circle, which serves for the measurement of the azimuthal motions of the vertical plane, is graduated to degrees, and the position of the magnetic meridian is determined, either by the usual method of measuring the position of the plane perpendicular to that meridian; or, a horizontal needle mounted upon a pivot with a cylindrical handle of brass having an axis, may be used instead of the dipping needle, being placed in the magnetic meridian, and by the aid of the azimuthal motion of the vertical circle, is found to answer the purpose even better than the other mode. The two dipping needles which accompany the instrument are each of them six inches in length, and in the form of rhombs, terminated very acutely towards each extremity. The breadth across the shorter diagonal of the rhombs is four-tenths of an inch. The axis, when the observation of the dip is made, rests upon agate supports, and its uniform central position upon them is secured by two brass Y's, which can be gently raised and lowered at will, so as to relieve the needle from the supports, or restore it to its bearing upon them, and affords

by that process the facility of measuring the dip of the needle several times in each position. For the purpose of designating the magnetic poles, the two ends on one side of each needle, are marked A and B. A spirit level is attached to the uppermost normal point of the vertical circle, and is levelled by three foot screws.

The method of observation is as follows:

1. The plane of the vertical circle being in the magnetic meridian, the graduated face of the instrument and the marked side of the needle to the east, I wait for the needle to come to a state of rest, and then read off its position at its two extremities for the purpose of correcting the eccentricity of the needle. Should the observation be unexpectedly disturbed a little, by a brisk or strong wind, as is sometimes the case, then I measure the position of the needle when the arc of vibration is reduced to about ten or fifteen minutes, taking the mean of the extreme oscillations at both ends.

Without disturbing the position of the instrument, I now, by the aid of the brass Y's, lift up the needle and gently let it down to bear again on its agate supports. When at rest, I read off again as before. I repeat the same operation three times, and each time take the mean of both ends; thus obtaining three mean readings, the sum of which being divided by three, gives the mean of six readings in the same position of the instrument and needle. The three mean readings generally differ but by very few minutes; the extreme difference, so far, with my instrument, very seldom goes to ten minutes.

2. I correct the want of parallelism of the zero line and level, by turning slowly the vertical circle 180° azimuth, which brings the face of the instrument and the marked side of the needle from the east to the west, and there I make six readings, the mean of which taken as before, gives the dip in this second position of the instrument and needle.

Now, was the needle of a perfect construction, the mean of the two results obtained in the two preceding positions would be the true magnetic dip at the place of observation. But, as such perfection cannot be expected, it becomes necessary to recur to the following operations for the purpose of compensating all the errors arising from the position of the magnetic axis of the needle.

3. Leaving the instrument in its second position, I proceed to correct the want of coincidence between the magnetic axis, and the axis of figure of the needle, by turning in the brass Y's, the marked side of the needle from the west to the east, and repeating the six readings as above stated.

4. Turning again the face of the vertical circle to the east, (leaving the needle as in the preceding position,) and reading off six times as before, it makes twenty-four readings for the first magnetic state of the needle, which I designate by the words *poles direct.*

A second magnetic state of the needle is required for correcting the errors resulting from the centre of gravity being out of the axis of the needle. To that effect, the poles are reversed by the action of two magnetic bars of nearly seven inches in length, and the entire observation of the dip repeated in the same order as to the four positions described above, which gives twenty-four readings, the result of which I call *poles reversed.* The second needle furnishes the same number of readings, making ninety-six readings in all. This is the number actually taken at each of the places recorded in this paper, with the exception of No. II. and III. where only two readings, one of each pole, were made in each position of the instrument and needle.

The instrument was placed upon a very convenient tripod, to which was fixed a square table, with an azimuthal instrument to bring the vertical circle in the magnetic meridian when on the zero of the vertical circle; and the whole being well adjusted, stood firmly and steadily during the observation, as proved by the spirit level, which very seldom required to be corrected.

I was induced to adopt the preceding method by analogy with what is practised in taking altitudes with an astronomical circle, in which case, to complete an observation, it is required to take one altitude with the face of the instrument on one side, and then a conjugate observation on the opposite side. I was not aware at that time that the mode of observing the dip I have followed had undergone a slight modification on the part of many observers, who, instead of turning the vertical circle 180°, to bring it to the second position, prefer leaving it in its original position, and change only the marked side of the needle in its brass Y's, with the view, I suppose of saving one turning of the face of the vertical circle, in the observation of any one of the magnetic states of the needle. But there can be no objection to the mode I have followed, for, if for fear of disturbing the instrument it be thought proper to save one turning of it, this is only avoiding one cause of disturbance to introduce another, which is perhaps as great, since it compels them to open twice the glass door, to change the face of the needle, with a manipulation, it would seem, more likely to bring on a disturbance, than the simple and smooth

turning of the vertical circle. This, however, is a matter of very secondary importance, the spirit level attached to the instrument, being in all cases to be scrupulously consulted; and, I trust this will be shown by the results of my observations, compared with others.

During my late visits to the northern lakes and return, I was accompanied by my friend Professor Ducatel, who assisted me in recording the observations. We were both very particular in the selection of the stations of observations, retiring at convenient but sufficient distances from towns, settlements, or large establishments, and always consulting the geological formation of the surrounding country and spot. I need not say that we were also very particular as to the removal from our persons of all iron or steel, under any form whatever.

I. *Magnetic Dip at Philadelphia. Latitude* 39° 57′ 8″ *N.; Longitude* 75° 11′ 31″ *West of Greenwich.*

Place of observation the Girard College.

Date.	Hour.		Needle No. 1.	Needle No. 2.
1841, April 26,	4—6, P. M.	Observed dip with Poles direct,	71° 55′ .1	71° 54′ .7
"	"	" Poles reversed,	63 .4	59 .6
		Mean dip,	71 59 .25	71 57 .15
		Mean dip of both needles,		71 58 .20

These observations were made by Professor A. D. Bache, of Philadelphia, before sending the instrument to me in Baltimore, by way of comparison.

II. *Magnetic Dip at Baltimore, Maryland. Latitude* 39° 17′ 55″ *N.; Longitude* 76° 37′ 50″ *W.*

Place of observation, the second square N. E. of the Washington Monument. (The station of observation of Professor A. D. Bache.)

Date.	Hour.		Needle No. 1.	Needle No. 2.
1841, April 28,	9—12, A. M.	Observed dip, Poles direct,	71° 33′.00	71° 38′.75
"	"	" Poles reversed,	36 .75	31 .00
		Mean dip,	71 34 .87	71 34 .87
		Mean dip of both needles,		71 34 .87.

III. *Magnetic Dip at Baltimore, Maryland.*

Place of observation the Botanical Garden of St. Mary's College.

Date.	Hour.		Needle No. 1.	Needle No. 2.
1841, April 28,	3—6, P. M.	Observed dip, Poles direct,	71° 41′.37	71° 35′.37
"	"	" Poles reversed,	33 .87	43 .75
		Mean dip,	71 37 .62	71 39 .56
		Mean dip of both needles,		71 38 .59

During the observations of this day at Baltimore, Professor John Locke, of Cincinnati, made at the same time, and places, and with his own dipping instrument, consentaneous observations.

IV. *Magnetic Dip at Washington city, D. C. Latitude* 38° 53′ 31″ *N.; Longitude* 77° 1′ 24″ *W.*

Place of observation the eastern garden of the capitol, at about the middle of the central avenue.

Date.	Hour.		Needle No. 1.	Needle No. 2.
1841, June 5,	7—10, A. M.	Observed dip, Poles direct,	71° 11′.20	71° 17′.25
"	"	" Poles reversed,	19 .00	14 .00
		Mean dip,	71 15 .10	71 15 .62
		Mean dip of both needles,		71 15 .36

The observations of this day were made conjointly with Major J. D. Graham, he observing with an instrument of Gambey's construction, and I with my Robinson's.—Weather fine, light north-west wind, light clouds near the horizon. The temperature during the observations from 72° to 84°.

V. *Magnetic Dip at Washington city, D. C.*

Place of observation the same as the preceding.

Date.	Hour.		Needle No. 1.	Needle No. 2.
1841, July 15,	7—9¼, A. M.	Observed dip, Poles direct,	71° 18′.75	71° 10′.50
"	"	" Poles reversed,	9 .50	21 .25
		Mean dip,	71 14 .12	71 15 .87
		Mean dip of both needles,		71 15 .00

Remarks.—Weather cloudy, calm and sultry. Last night, a heavy storm between 9 and 11 o'clock. The temperature during the observations from 79° to 81°.

VI. *Magnetic Dip at Washington city, D. C.*

Place of observation the same as the preceding.

Date.	Hour.		Needle No. 1.	Needle No. 2.
1841, July 16,	6¾—9¼, A. M.	Observed dip, Poles direct,	71° 11′.00	71° 17′.75
"	"	" Poles reversed,	16 .75	9 .75
		Mean dip,	71 13 .87	71 13 .75
		Mean dip of both needles,		71 13 .81

Remarks.—Sky clear, N. W. wind, tolerably strong. The temperature during the observations from 73° to 76°.

VII. *Magnetic Dip at Washington city, D. C.*

Place of observation the garden of the Washington Observatory, on Capitol hill, (about 300 yards N. N. W. of the preceding station.?)

Date.	Hour.		Needle No. 1.	Needle No. 2.
1841, Aug. 13,	1—3¼, P. M.	Observed dip, Poles direct,	71° 17′.50	71° 13′.00
"	"	" Poles reversed,	11 .52	17 .80
		Mean dip,	71 14 .51	73 15 .40
		Mean dip of both needles,		71 14 .95

Remarks.—Weather cloudy, light south wind. The temperature during the observations from 78° to 81°.

VIII. *Magnetic Dip at Baltimore, Md.*

Place of observation the second square north-east of the Washington monument, station of observation of Professor Bache, and occupied by myself and Dr. Locke, on the 28th April, 1841. (See No. II., above, in this paper.)

Date.	Hour.		Needle No. 1.	Needle No. 2.
1841, Aug. 19,	9—11½, A. M.	Observed dip, Poles direct,	71° 32′.40	71° 37′.22
		Poles reversed,	42 .00	32 .00
		Mean dip,	71 37 .20	71 34 .61
		Mean dip of both needles,		71 35 .90

Remarks.—Sky clear, light south wind. The temperature during the observations from 73° to 79°.

IX. *Magnetic Dip at Baltimore, Md.*

Place of observation the grove north of the Washington monument, (station of observation of Professor Loomis, as pointed out to me by Mr. T. Green, of Baltimore.)

Date.	Hour.		Needle No. 1.	Needle No. 2.
1841, Aug. 19,	12—2, P. M.	Observed dip, Poles direct,	71° 55′.50	71° 44′.95
"	"	" Poles reversed,	46 .72	53 .10
		Mean dip,	71 51 .11	71 49 .02
		Mean dip of both needles,		71 50 .06

Remarks.—Sky clear, moderate south wind. The temperature during the observations from 83° to 85°.

X. *Magnetic Dip at Baltimore, Md.*

Place of observation the botanical garden of St. Mary's college.

Date.	Hour.			Needle No. 1.	Needle No. 2.
1841, Aug. 20,	9½—12, A. M.	Observed dip,	Poles direct,	71° 37′.58	71° 44′.82
"	"	"	Poles reversed,	41 .45	35 .17
			Mean dip,	71 39 .51	71 40 .00
			Mean dip of both needles,		71 39 .75

Remarks.—Weather cloudy, moderate south-west wind. The temperature during the observations from 87° to 95°.

These observations were made in a pavilion, constructed, at my suggestion, by the liberality of the Rev. Gentlemen of St. Mary's college. Observations No. III., made in a different part of the garden, show that the brick wall, which passes at the distance of seventy-eight feet from the pavilion, has no appreciable effect upon the magnetic dip.

XI. *Magnetic Dip at Albany, N. Y. Latitude* 42° 39′ 3″ *N.; Longitude* 73° 44′ 49″ *W.*

Place of observation out of the city, about half a mile west of the capitol, south corner of the Cemetery, near the Orphan Asylum.

Date.	Hour.			Needle No. 1.	Needle No. 2.
1841, Aug. 29,	4—6½, P. M.	Observed dip,	Poles direct,	74° 43′.55	74° 39′.17
"	"	"	Poles reversed,	41 .60	35 .37
			Mean dip,	74 42 .57	74 37 .27
			Mean dip of both needles,		74 39 .92

Remarks.—Weather cloudy and sultry, drizzling towards the close of the observations. The temperature during the observations from 77° to 73°.

The needle No. 2, (after reversing the poles,) very sluggish, although carefully magnetized.

XII. *Magnetic Dip at Oswego, N. Y. Latitude* 43° 28′ *N.; Longitude* 76° 30′ *W.*

Place of observation at Mr. G. H. Woodruff's garden, near the Baptist Church, the eastern end of the part of the town situated on the right side of Oswego River.

Date.	Hour.			Needle No. 1.	Needle No. 2.
1841, Sept. 1,	10—12½, A. M.	Observed dip,	Poles direct,	75° 7′.82	74° 59′.12
"	"	"	Poles reversed,	9 .87	75 15 .60
			Mean dip,	75 8 .84	75 7 .36
			Mean dip of both needles,		75 8 .10

Remarks.—Sky clear, light north-west wind. The temperature during the observations from 70° to 73°.

XIII. *Magnetic Dip at Niagara Falls, N. Y. side. Latitude* 43° 2′ *N.; Longitude* 79° 12′ *W.*

Place of observation on the skirt of the wood bordering on the Niagara River, east of the town of Niagara, about three hundred yards south-east of Cataract Hotel.

Date.	Hour.			Needle No. 1.	Needle No. 2.
1841, Sept. 5,	$9\frac{1}{4}$—$11\frac{3}{4}$, A. M.	Observed dip,	Poles direct,	74° 51′.72	74° 53′.05
"	"	"	Poles reversed,	49 .62	45 .80
			Mean dip,	74 50 .67	74 49 .42
			Mean dip of both needles,		74 50 .04

Remarks.—Weather fine, calm. The temperature during the observations from 69° to 76°.

XIV. *Magnetic Dip at Niagara Falls, Canada side.*

Place of observation in the meadow, about thirty yards west of Clifton House.

Date.	Hour.			Needle No. 1.	Needle No. 2.
1841, Sept. 5,	3—6, P. M.	Observed dip,	Poles direct,	74° 56′ .7	74° 46′.55
"	"	"	Poles reversed,	56 .6	59 .10
			Mean dip,	74 56 .65	74 52 .82
			Mean dip of both needles,		74 54 .73

Remarks.—Weather fine, light south wind. The temperature during the observations from 70° to 73°.

The two stations of this day at the Niagara Falls, one mile apart of each other, the second nearly north-west of the first.

XV. *Magnetic Dip at Detroit, Michigan. Latitude* 42° 19′ *N.; Longitude* 83° 3′ *W.*

Place of observation at Judge E. Farnsworth's Orchard, Jefferson avenue, upper end of the city.

Date.	Hour.			Needle No. 1.	Needle No. 2.
1841, Sept. 10,	$9\frac{1}{2}$—$11\frac{1}{4}$, A. M.	Observed dip,	Poles direct,	73° 34′.60	
"	"		Poles reversed,	30 .90	
			Mean dip of No. 1,	73 32 .75	

Remarks.—Weather cloudy, south-west wind. The temperature during the observations from 76° to 78°.

The sudden arrival and departure of a steam-boat which I was expecting to furnish me a passage for Makinag, did not allow me time to observe the dip with needle No. 2.

XVI. *Magnetic Dip at Michillimakinag Island, Michigan. Latitude* 45° 51′ *N.; Longitude* 84° 23′ *W.*

Place of observation in the Juniper grove, on the Lake shore, about a quarter mile south-west from the new Fort Makinag, and out of the village.

Date.	Hour.			Needle No. 1.	Needle No. 2.
1841, Sept. 12,	3¼—5¼, P. M.	Observed dip,	Poles direct,	76° 32′.16	76° 37′.18
"	"	"	Poles reversed,	35 .95	31 .70
			Mean dip,	76 34 .05	76 34 .44
			Mean dip of both needles,		76 34 .24

Remarks:—Weather, flying clouds, sun shining at intervals; brisk north-west wind, increasing during the observations. The temperature during the observations from 70° to 75°. The sky, which was overcast during the evening, cleared up about ten o'clock, at which time a beautiful aurora borealis made its appearance, with brilliant coruscations, and remained luminous part of the night.

XVII. *Magnetic Dip at Michillimakinag Island, Michigan.*

Place of observation west side of the ruin of old Fort Holmes, on the top of the hill, about two hundred and sixty feet above the level of the Lake.

Date.	Hour.			Needle No. 1.	Needle No. 2.
1841, Sept. 13,	2¼—4, P. M.	Observed dip,	Poles direct,	76° 37′.10	76° 32′.05
"	"	"	Poles reversed,	30 .75	39 .75
			Mean dip,	76 33 .92	76 35 .90
			Mean dip of both needles,		76 34 .91

Remarks:—Weather cloudy, south-west wind, rather strong towards the close of the observations. The temperature during the observations from 76° to 70°. During the ensuing night the sky cleared up, and at about 11 o'clock was perfectly clear, the aurora borealis, as in the preceding night, appearing with great beauty. I was, unfortunately, so situated as not to be able to allow my magnetic apparatus to remain in position, whereby I might have ascertained any influence exercised by this phenomenon.

XVIII. *Magnetic Dip at Chicago, Illinois. Latitude* 42° 0′ *N.; Longitude* 87° 44′ *W.*

Place of observation in a small grove, near the borders of Lake Michigan, and north side of Chicago River.

Date.	Hour.			Needle No. 1.	Needle No. 2.
1841, Sept. 18,	9¾—11¾, A. M.	Observed dip,	Poles direct,	72° 42′.22	72° 48′.75
"	"	"	Poles reversed,	49 .60	42 .80
			Mean dip,	72 45 .91	72 45 .77
			Mean dip of both needles,		72 45 .84

Remarks:—Weather cloudy, strong south-east wind. The temperature during the observations from 60° to 59°.

XIX. *Magnetic Dip at Juliet, Illinois. Latitude* 41° 30′ *N.; Longitude* 88° 9′ *W.*

Place of observation in the oak grove, near the church upon the hill, on the west side of Illinois and Chicago Canal.

Date.	Hour.			Needle No. 1.	Needle No. 2.
1841, Sept. 26,	$2\frac{1}{2}$—$4\frac{1}{4}$, A. M.	Observed dip,	Poles direct,	72° 21′.92	72° 10′.18
"	"	"	Poles reversed,	9 .55	22 .30
			Mean dip,	72 15 .73	72 16 .24
			Mean dip of both needles,		72 15 .98

Remarks:—Weather clear, light west wind. The temperature during the observations from 64° to 62°.

XX. *Magnetic Dip at Ottawa, Illinois. Latitude* 41° 15′ *N.; Longitude* 88° 50′ *W.*

Place of observation a quarter of a mile west of the town, near the wooden bridge, on the right bank of the creek, which consists of a soft sand stone.

Date.	Hour.			Needle No. 1.	Needle No. 2.
1841, Sept. 29,	8—$11\frac{3}{4}$, A. M.	Observed dip,	Poles direct,	72° 14′.12	72° 23′.38
"	"	"	Poles reversed,	27 .40	16 .08
			Mean dip,	72 20 .76	72 19 .73
			Mean dip of both needles,		72 20 .24

Remarks:—Weather cloudy, sun shining at intervals, brisk north-west wind. The temperature during the observations from 44° to 56°.

XXI. *Magnetic Dip at Peru, Illinois. Latitude* 41° 13′ *N.; Longitude* 89° 3′ *W.*

Place of observation on the immediate right bank of Illinois River, in a willow grove, about eighty yards from the lower end of the town.

Date.	Hour.			Needle No. 1.	Needle No. 2.
1841, Sept. 30,	$3\frac{1}{4}$—$5\frac{1}{2}$, P. M.	Observed dip,	Poles direct,	71° 51′.20	71° 46′.22
"	"	"	Poles reversed,	48 .35	54 .82
			Mean dip,	71 49 .77	71 50 .52
			Mean dip of both needles,		71 50 .14

Remarks:—Clouds gathering to the west, and the air almost calm at the beginning of the observation of Needle No. 1; north-west wind rises brisk and strong at intervals, needle restless; its positions are measured by means of its shortest vibrations. Calm weather succeeded again towards the close of the observation of needle No. 1, but, being afraid of being disturbed again by simi-

lar atmospheric changes, I moved the instrument to a ravine in the bluff, about one hundred yards north of the former station, and there I observed the needle No. 2.

The next morning I repeated the observations of both needles at the station of the needle No. 2, of this day, as will be seen in the following records.

XXII. *Magnetic Dip at Peru, Illinois.*

Place of observation in a ravine about eighty yards from the lower end of the town, and about one hundred yards north of the Illinois River, the same station as occupied yesterday for needle No. 2.

Date.	Hour.			Needle No. 1.	Needle No. 2.
1841, Oct. 1,	$9\frac{1}{4}$—$11\frac{1}{2}$, A. M.	Observed dip,	Poles direct,	71° 45′.70	71° 53′.30
"	"	"	Poles reversed,	53 .23	44 .55
			Mean dip,	71 49 .46	71 48 .92
			Mean dip of both needles,		71 49 .19

Note.—The last three stations at Juliet, Ottawa, and Peru, whose latitudes differ but little, especially the last two named, yield, according to my observations, magnetic dips, which, as they are not justified by differences in longitude, so neither can they be accounted for on the supposition of any local attraction, as there are no indications of the occurrence of iron ore in the vicinity, the soil containing but the usual trifling proportion of oxide of iron belonging to nearly all regions, the influence of which is considered as inappreciable by our instruments. On the other hand, I have no reason to doubt the accuracy, within the usual limits, of my own observations, as they were made with a tried instrument, and with all the care of which I am capable. As, so far as I know, the true geographical position of these three places, has not been astronomically determined, it is possible that when this shall be done, there will be found more conformity in the relation existing between the difference of geographical position and that of the magnetic inclination. In reference to that subject, I have much regretted not to have been able to determine the position of these three places; the haste of my journey as well as the inclemency of the weather having prevented me, excepting at Ottawa. At all events, should any error have been made in determining the magnetic dip at any of these three stations, it cannot have happened at Peru, the result there having been confirmed during two consecutive days of observations. This error may arise from a repeated mistake in reading off the degrees of the two needles, which, though I cannot realize it to myself, is nevertheless possible, since, as at Ottawa, the different positions in which the needle is placed during a complete observation indicate degrees of different denominations. We should guard, however, against any preconceived notions in reference to phenomena so delicate and complicated as those relating to the laws that regulate the distribution of magnetism over the surface of the earth, and which are yet so little known to us.

The foregoing observations, therefore, are submitted for as much as they are worth for the present, in the hope that some future observer at Juliet, and Ottawa, will take the trouble to confirm or refute them.

Remarks:—Weather cloudy, light north-east wind. The temperature during the observations from 51° to 56°.

XXIII. *Magnetic Dip at St. Louis, Missouri. Latitude* 38° 37′ 28″ *N.; Longitude* 90° 15′ 10″ *W.*

Place of observation on the east side of the Mississippi River, in a grove opposite Bloody Island, near Illinois Town, about one mile east of St. Louis.

Date.	Hour.			Needle No. 1.	Needle No. 2.
1841, Oct. 6,	1¾—3¾, P. M.	Observed dip,	Poles direct,	69° 31′.05	69° 16′.98
"	"	"	Poles reversed,	24 .98	34 .08
			Mean dip,	69 28 .01	69 25 .33
			Mean dip of both needles,		69 26 .67

Remarks:—Sky clear, south-east wind, brisk at intervals. The temperature during the observations from 72° to 76°.

XXIV. *Magnetic Dip at St. Louis, Missouri.*

Place of observation in Mr. Henry Chouteau's orchard, on the west shore of Chouteau's pond, about half a mile west of the Mississippi River, or one and a half mile west of the preceding station.

Date.	Hour.			Needle No. 1.	Needle No. 2.
1841, Oct. 11,	2¼—4½, P. M.	Observed dip,	Poles direct,	69° 22′.90	69° 12′.62
"	"	"	Poles reversed,	29 .80	43 .18
			Mean dip,	69 26 .35	69 27 .90
			Mean dip of both needles,		69 27 .12

Remarks:—Weather cloudy and calm. The temperature during the observations, 67° to 65°.

XXV. *Magnetic Dip at Baltimore, Md.*

Place of observation the botanical garden of St. Mary's college.

Date.	Hour.			Needle No. 1.	Needle No. 2.
1841, Nov. 15,	11 A. M.—1½ P. M.	Observed dip,	Poles direct,	71° 46′.90	71° 49′.32
"	"		Poles reversed,	34 .12	33 .07
			Mean dip,	71 40 .51	71 41 .19
			Mean dip of both needles,		71 40 .85

Remarks.—Weather cloudy, sun shining at intervals, high south-west wind, not interfering with the observations as they were made in the Magnetic Pavilion recently constructed. (See the remarks No. X., above.)

This observation, which gives nearly the same result as that found at the same place on the 20th of August, before leaving Baltimore, shows that the needles have suffered no material changes during my magnetic tour.